研 究 論 文

籾殻と炭素繊維端材に由来する複合材料のバインダレス製造とその力学特性

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Binderless Fabrication of Composite Derived from Rice Husk and Carbon Fiber Ends and its Mechanical Properties

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A carbon/silica/carbon-fiber composite (CSCFC) was fabricated from agricultural waste of rice husk (RH) and industrial waste of carbon fiber (CF) ends. The powder-state RH mixed with chopped CF ends (0 to 30 mass%) was molded into a disk by means of hot-pressing in an inert condition without using any binders, and then heated to 500 and 1000℃. Mechanical properties of CSCFC and the role of CF addition level on them were evaluated. The CSCFC added with 10 mass% of CF and heated to 500℃ displayed the highest compressive strength of 61 MPa. It was also shown that higher heat treatment temperature reduced the compressivestrength. The CF restricted a uniform thermal shrinkage of the matrix material derived fromRH, causing cracks and eventually reducing the compressive strength. The friction coefficient atthe CSCFC surface was evaluated under a contact with a SUS304 ball. The CSCFC added with CF at 20 mass% and heated to 1000℃ displayed the lowest kinetic friction coefficient of 0.12. The CSCFC produced from waste materials of RH and CF ends were shown to have high compressive strength and low friction coefficient even if they were fabricated without using any binders.

Key Words : Composite, rice husk, carbon fiber, hot-pressing, bulk density, compressive strength, hardness, friction.